9.0 RI SUMMARY AND CONCLUSIONS

In March 1995, EPA initiated an RI/FS at the TP site to address all contamination at the site. The primary objective of the RI was to provide the additional data needed to support a baseline risk assessment and provide a basis on which to recommend a subsequent remedial action for the site. The RI included:

- A hydrogeologic investigation (Section 2.0)
- An air sampling investigation (Section 3.0)
- A waste sampling investigation (Section 4.0)
- A soil sampling investigation (Section 5.0)
- A surface water/sediment sampling investigation (Section 6.0)
- A groundwater sampling investigation (Section 7.0)
- A contaminant transport and fate analysis (Section 8.0)

The details of each of these investigations are presented in their appropriate sections and should be consulted for a full understanding of the results of the RI. The major conclusions reached as a result of the RI, and a summary statement of the BRA (CDM Federal 1999) findings, are listed below.

Coke Plant

- Analyses of particulate air samples collected at the coke plant indicate the air is contaminated with a wide variety of PAHs. However, PAHs are commonly found in air, especially in urban/industrial settings.

- Analyses of soil samples collected at the coke plant indicate extensive contamination by a wide variety of VOCs, SVOCs, pesticides, and inorganics. Low level concentrations of dioxins/furans were also found. The majority of the VOC/SVOC contaminants found are known to be petroleum and coal-tar derivatives. In addition, many of the pesticides found (i.e., the BHC isomers) may be associated with other past plant operations at the coke plant.

- The site is underlain by a surficial unconfined aquifer which can be divided into two hydrostratigraphic zones: a soil overburden zone and a bedrock zone. Groundwater

flow at the site is generally toward Chattanooga Creek, where it discharges. The rate and direction of flow at any particular point, however, can vary substantially across the site due to the extreme heterogeneous nature of the aquifer. Hence, groundwater flow is expected to follow tortuous preferential pathways which may lead both upward and downward throughout the aquifer at this site.

Analyses of groundwater samples at the coke plant indicate extensive contamination by a wide variety of VOCs, SVOCs, pesticides, and inorganics. The concentrations of many of the contaminants found are well above MCLs.

The organic chemical contamination can generally be grouped into the following seven categories: aromatic hydrocarbons, chlorinated non-aromatic hydrocarbons, acetone, SVOC chlorobenzenes, PAHS and dibenzofuran, phenols, and BHC isomers. A fairly distinct plume of contamination was identified for each of these groups of organic chemicals. Note that all of these organic chemicals are known to be petroleum and coal-tar derivatives, except the chlorinated non-aromatic hydrocarbons, acetone, and the BHC-isomers. While the source of the chlorinated non-aromatic hydrocarbons and acetone is unknown, the source of the BHC isomers may be associated with other past plant operations at the coke plant. Unlike the organic contamination, the inorganic contamination appears to be erratic (i.e., no patterns are discernable) and hence could not be grouped into any specific categories.

The overall extent of groundwater contamination at the coke plant appears to be limited primarily to the coke plant and Velsicol Chemical Company properties. In addition, two strong source areas of groundwater contamination have been identified and appear to be associated with the DNAPL pools visually discovered through drilling of two monitor wells. No other NAPL pools were visually discovered during the RI, but the potential for other NAPL pools within the historic processing area of the coke plant is great, based on the history of site activities, as well as the groundwater analytical data collected to date.

- In the current use, the carcinogenic risk at the coke plant is within the EPA's acceptable range (between one-in-ten-thousand and one-in-one-million), and non-cancer effects are not expected. In the future, assuming development as a commercial/industrial property, the calculated total incremental lifetime cancer risk is above the EPA's target range, and non-cancer effects are possible. The non-cancer risk is solely due to the conservative assumption that a future on-site industrial worker will consume contaminated groundwater.

Northwest and Northeast Tributaries

- Analyses of surface water and sediment samples collected at or downstream of the coke plant (i.e., from the coke plant, Northeast Tributary, and Northwest Tributary) as well as dredge spoil material from dredging of the Northeast Tributary in the mid 1980s, indicate contamination by a wide variety of VOCs, SVOCs, pesticides, and inorganics. The majority of the VOC/SVOC contaminants found are known to be petroleum and coal-tar derivatives. In addition, many of the pesticides found (i.e., the BHC isomers) may be associated with other past plant operations at the coke plant.

- The presence of coal-tar constituents in the Northeast Tributary sediments and dredge spoils, as well as surface drainage analysis of historical aerial photographs conducted by EPA (EPA 1997a), indicates that the tributary was a pathway for these constituents to travel from the site to Chattanooga Creek via drainage channels.

- These surface runoff pathways cross the southeast portion of the Landes Company property where subsurface contamination was discovered in 1996. Aerial photograph interpretations from 1953, 1958 and 1962 show this area of the Landes Company property as a low swampy area. It would be expected that coal tar would accumulate in that environment.

- Total incremental lifetime cancer risk associated with the Northwest Tributary (for both current and future use scenarios) is within the EPA's target range. Similarly, risk calculations indicate that non-cancer effects would not be expected.

- Total incremental lifetime cancer risk associated with the Northeast Tributary (for both current and future use scenarios) is above the EPA's target range. Risk calculations indicate that non-cancer effects would not be expected.

Schwerman Trucking Site

- Analyses of particulate air samples collected at Schwerman Trucking site indicate the air is contaminated with a wide variety of PAHs. However, PAHs are commonly found in air, especially in urban/industrial settings.

- Except for low level detections of a few dioxins/furans, no organic compounds were detected in the waste samples collected from the ST site, indicating that this waste material is not coal tar waste. Four metals, however, were measured at concentrations exceeding background surface soil criteria. Most notable are the high concentrations of nickel found in all three waste samples.

- Analyses of soil samples collected at the ST site indicate contamination by a few pesticides and inorganics, none of which appear to be site-related. Of the contaminants identified, most notable are the high concentrations of nickel found in all eight soil samples.

- Analyses of groundwater samples at ST site indicate contamination by a few VOCs and inorganics. The nature of the contamination at this source area, however, appears to be very different from that found at the coke plant, and hence this contamination is not likely associated with the coke plant. In addition, while the extent of contamination is uncertain, it is likely limited to a small area due to the nearby presence of Chattanooga Creek, a hydrogeologic boundary. The concentrations of some of the contaminants found are above MCLs.

- The calculated total incremental lifetime cancer risk from current use of the ST site is well below the EPA's target range. Similarly, non-cancer effects would not be expected under a current-use scenario. In the future, assuming development as a commercial/industrial property, the calculated total incremental lifetime cancer risk is above the EPA's target range, and non-cancer effects are possible. The non-cancer risk is solely due to the conservative assumption that groundwater from the site will be consumed.

Chattanooga Creek Tar Deposit

- Analysis of the one waste sample collected from the Chattanooga Creek Tar Deposit indicated high levels of both VOCs and PAHs, all of which are common derivatives of petroleum and coal tar. Low levels of dioxins/furans were also measured in this sample. In addition, several inorganics were measured at concentrations exceeding background surface soil criteria.

- Analyses of soil samples collected at the Chattanooga Creek Tar Deposit indicate contamination by a wide variety of SVOCs, pesticides, and inorganics.

- Analyses of groundwater samples at the Chattanooga Creek Tar Deposit indicate very minimal, if not insignificant, groundwater contamination from this source area.

- The total incremental lifetime cancer risk and the risk of non-cancer effects are within EPA's acceptable target range for both the current and future use scenarios.

Chattanooga Creek Sediments and Groundwater

- Analyses of three sediment samples collected from Chattanooga Creek during this remedial investigation (prior to the non-time critical removal) indicated the sediments in this creek were contaminated by dioxins/furans at low concentrations. Analyses of sediment samples collected from this creek prior to this remedial investigation also indicate the sediments in this creek are contaminated by a wide variety of VOCs, SVOCs, pesticides/PCBs, and inorganics, many of which are known to be petroleum and coal-tar derivatives or pesticides potentially associated with past plant operations at the coke plant.

- Analyses of groundwater samples collected along Chattanooga Creek indicate that the coal tar deposits that were in the sediments of Chattanooga Creek are likely a source of groundwater contamination along this creek. All but one of the organic chemicals detected were also found at the coke plant, and all the SVOCs and VOCs detected are known to be petroleum and coal-tar derivatives. The extent of the groundwater contamination associated with the sediments of Chattanooga Creek, however, is likely limited to a narrow band along the creek, and is also likely limited to the soil overburden zone of the aquifer due to the hydrogeology of the area. However, the concentrations of some of the contaminants found are above MCLs.

- Risk calculations for the Chattanooga Creek sediments and groundwater are based on data collected prior to the cleanup action in 1997 and 1998. Total incremental lifetime cancer risk and risk of non-cancer effects exceeded the EPA's target range for both the current and future use scenarios.

Residential Areas

- Analyses of soil samples collected from residential areas indicate the presence of a variety of SVOCs, pesticides, and inorganics at concentrations that are higher than background concentrations. There is no apparent pattern to the distribution of the constituents that exceed background concentrations.

- For current and future use, the incremental lifetime cancer risk associated with the residential area is within EPA's acceptable range (one-in-ten-thousand to one-in-one-million). There is a potential for non-cancer risks in both the current and future use scenarios. Generally, the constituent that is driving the risk in these scenarios is manganese. It is important to note that the background concentration of manganese (1,368 mg/kg), is high relative to the risk-based screening level 180 mg/kg.